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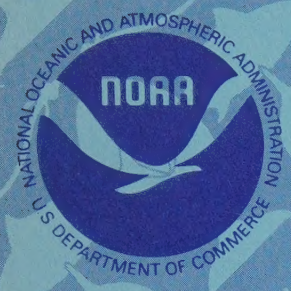

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TIME/AREA DISTRIBUTION AND COMPOSITION OF THE INCIDENTAL KILL OF DOLPHINS AND SMALL WHALES IN THE U.S. PURSE-SEINE FISHERY FOR TUNA IN THE EASTERN TROPICAL PACIFIC, 1979-1980

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TIME/AREA DISTRIBUTION AND COMPOSITION OF THE INCIDENTAL KILL OF DOLPHINS AND SMALL WHALES IN THE U.S. PURSE-SEINE FISHERY FOR TUNA IN THE EASTERN TROPICAL PACIFIC, 1979-1980

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INTRODUCTION

Data on composition of the U.S. incidental purse-seine kill of small cetaceans have been presented and analyzed in a series of publications (Perrin, Coe and Zweifel, 1976; Perrin, Holts and Miller, 1977; Perrin, Miller and Sloan, 1977; Perrin and Henderson, 1979; Smith, 1979; and Henderson, Perrin and Miller, 1980). Recent studies have shown that the data may be subject to biases, of several kinds. The purpose of this paper is to present the data for 1979 and 1980 and to discuss the biases affecting them.

METHODS

The kill data and the life-history specimens from which the data on reproductive condition were derived were collected by fishery technicians employed by the U.S National Marine Fisheries Service (NMFS) and the Inter-American Tropical Tuna Commission (IATTC) aboard commercial purse-seiners. Data on kill by time and area reported here were collected only by the NMFS technicians. Data on sex composition, reproductive condition and length frequencies of the kill, were collected by IATTC and NMFS technicians. NMFS technicians collected data on 62 cruises in 1979 and 41 cruises in 1980. IATTC technicians collected data on 25 cruises in 1979 and 38 in 1980. The sampling scheme is described in Smith (1979), and copies of the forms used are included here as Appendices 1 and 2. Laboratory procedures for processing the specimens and criteria for sexual maturity were as described in Perrin et al. (1975 and 1977). The management units used here are defined in Smith (1979). Dolphins not identified to species are not included in the data presented here. The NMFS observed-kill data are presented by 5^{o}-square areas (Figure 1). The computer programs used to summarize data on reproductive condition were described by Henderson and Perrin (1980).

RESULTS

Incidental kill data by area and month are presented for 8026 small cetaceans in Tables 1-5. Sex data for 3408 dolphins, by area and quarter are presented in Tables 6-10. Length-frequency data for 3455 specimens are presented in Tables 11-13 and reproductive-condition data for 1850 females in Tables 14-16.

DISCUSSION

Several potential sources of bias have been identified and are discussed below. For some, adjustment procedures have been developed; others have not yet been so addressed.

Effects of size of kill

Powers and Barlow (1979) examined the age structure of kill samples in relation to the size of the kill in the purse-seine set from which the samples came. They found that for the spotted dolphin, Stenella attenuata, samples from small-kill sets contained proportionately more calves than did those from large-kill sets. This has been interpreted to mean that calves are more vulnerable to death in the purse-seine operation than are adults, and therefore when only a few animals are killed, they tend to be calves. This would mean that the large-kill samples are more representative of the populations at large (or, at least, the animals captured) than are the small-kill samples. The most recent analyses of data for S. attenuata to estimate reproductive rates have taken this presumed effect into account by including only samples from net sets in which 40 or more spotted dolphins were killed (Henderson, Perrin and Miller, 1980). Powers and Barlow (1979) did not find a similar effect for the spinner dolphin, S. longirostris, and analyses for that species have been based on all samples regardless of kill size (Perrin and Henderson, 1979). The data for other species (S. coeruleoalba and Delphinus delphis) have not been examined for the presence of a kill-size effect.

An aspect of the kill-size effect that has not been taken into account relates to the fact that the technicians at sea do not process all dead animals that pass across the deck; they are limited to 30-40 dolphins by constraints of time and space. This means that the animals from small-kill (less than 30-40 sets) are usually all examined, whereas only a subsample of the animals from large-kill sets are examined, amplifying the bias caused by the kill-size effect for S. attenuata and possibly for S. coeruleoalba and D. delphinus. The under-representation of animals from large-kill sets in the life-history samples is shown in Figure 2 and Table 17.

Effect of seasonality

Perrin et al. (1976) and Perrin et al. (1977) described diffuse seasonality in breeding of spotted and spinner dolphins in the eastern tropical Pacific, with 2 or more peak periods during the year. Because of the multiple peaks, the diffuseness, and the fact that the length of gestation is nearly a year (11.5 months in S. attenuata and 10.6 months in S. longirostris, the effect of seasonal sampling bias (as can be seen in Tables 1-5) on estimates of reproductive rates cannot be large. Barlow (1979) examined the effect of seasonality and developed a method to adjust for it. He found a maximum effect on pregnancy-rate estimates of 4% (for eastern spinner dolphins). Barlow also described variation in seasonal breeding peaks between sub-areas of what have been assumed to be areas containing single interbreeding populations. He concluded that the effect of seasonal-sampling bias on estimates of reproductive rates is probably more than the maximum 4% that he found because of this confounding of breeding units in the analyses. Stuntz (1980) also found areal variation in seasonality, within putative

interbreeding populations of the spotted dolphin. This confounding of populations, of course, has other implications for assessment and management. As fishing effort is not evenly distributed by area, the various cryptic subpopulations may differ from each other in status and production.

Other biasing effects

Stuntz (1980) found differences in the age structure of spotted dolphin samples with size of the dolphin school (more calves in smaller schools) tons of yellowfin tuna captured (fewer calves with larger tuna catches) and length of the chasing and corralling phase (see Perrin, 1969, for description of fishing operation)(fewer calves after longer chases) as well as with area and time of year. He pointed out that there are alternative explanations for the observed trends and noted that definitive analyses of the biases must be carried out before the structural (and reproductive) dynamics of the populations can be modeled with any confidence.

ACKNOWLEDGEMENTS

The owners, captains and crews of the U.S. tuna fleet cooperated fully with the collection of data and specimens. We thank them and the many NMFS and IATTC technicians who carried out the field work.
R. B. Miller and V. L. Cass processed the specimens in the laboratory and prepared the data for analysis. M.S. Lowry and T. C. Foster reviewed the final tables. K. S. Raymond prepared the figures, and V. Hostler typed the manuscript.

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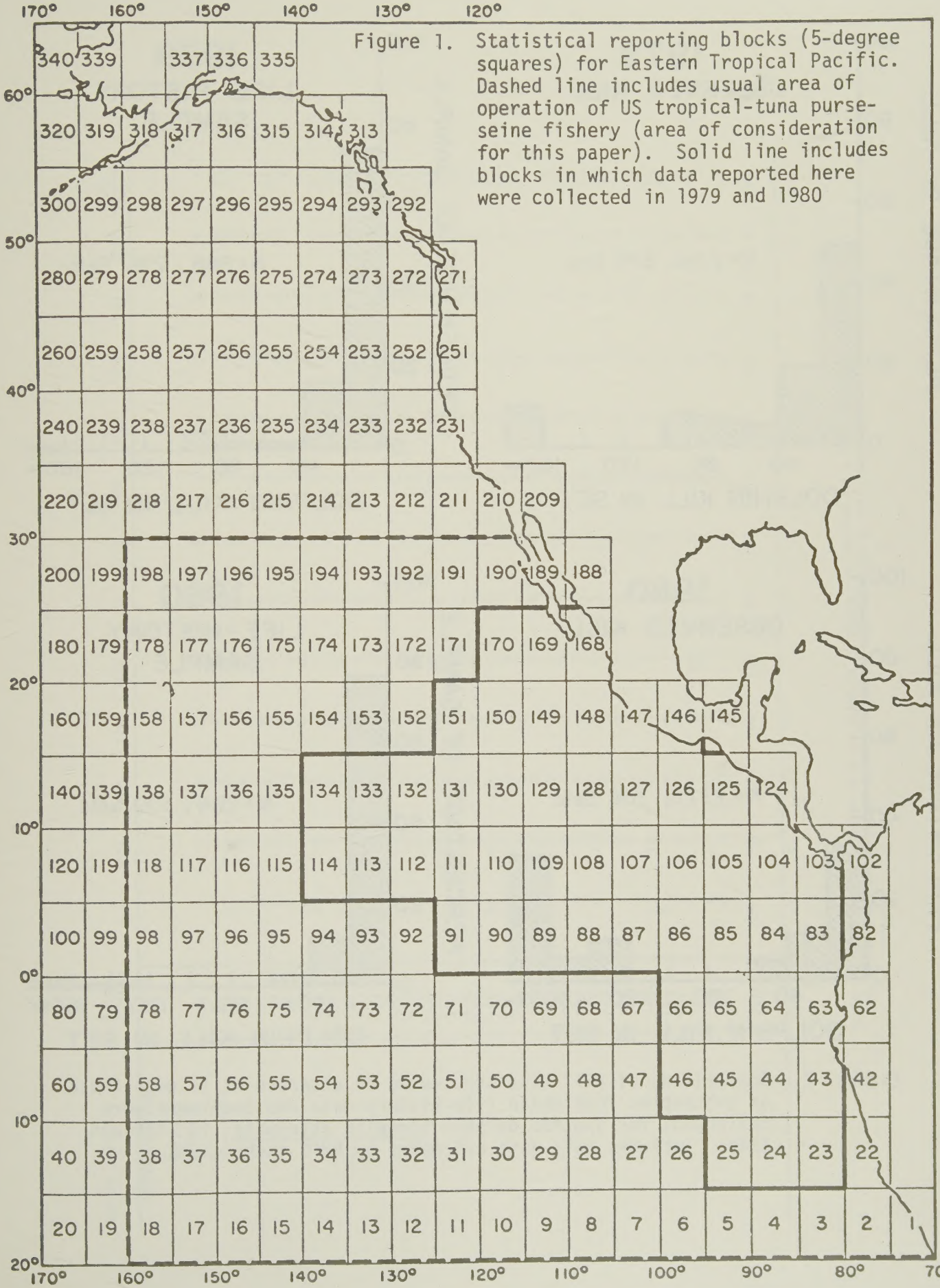

Figure 1. Statistical reporting blocks (5-degree squares) for Eastern Tropical Pacific. Dashed line includes usual area of operation of US tropical-tuna purse-seine fishery (area of consideration for this paper). Solid line includes blocks in which data reported here were collected in 1979 and 1980

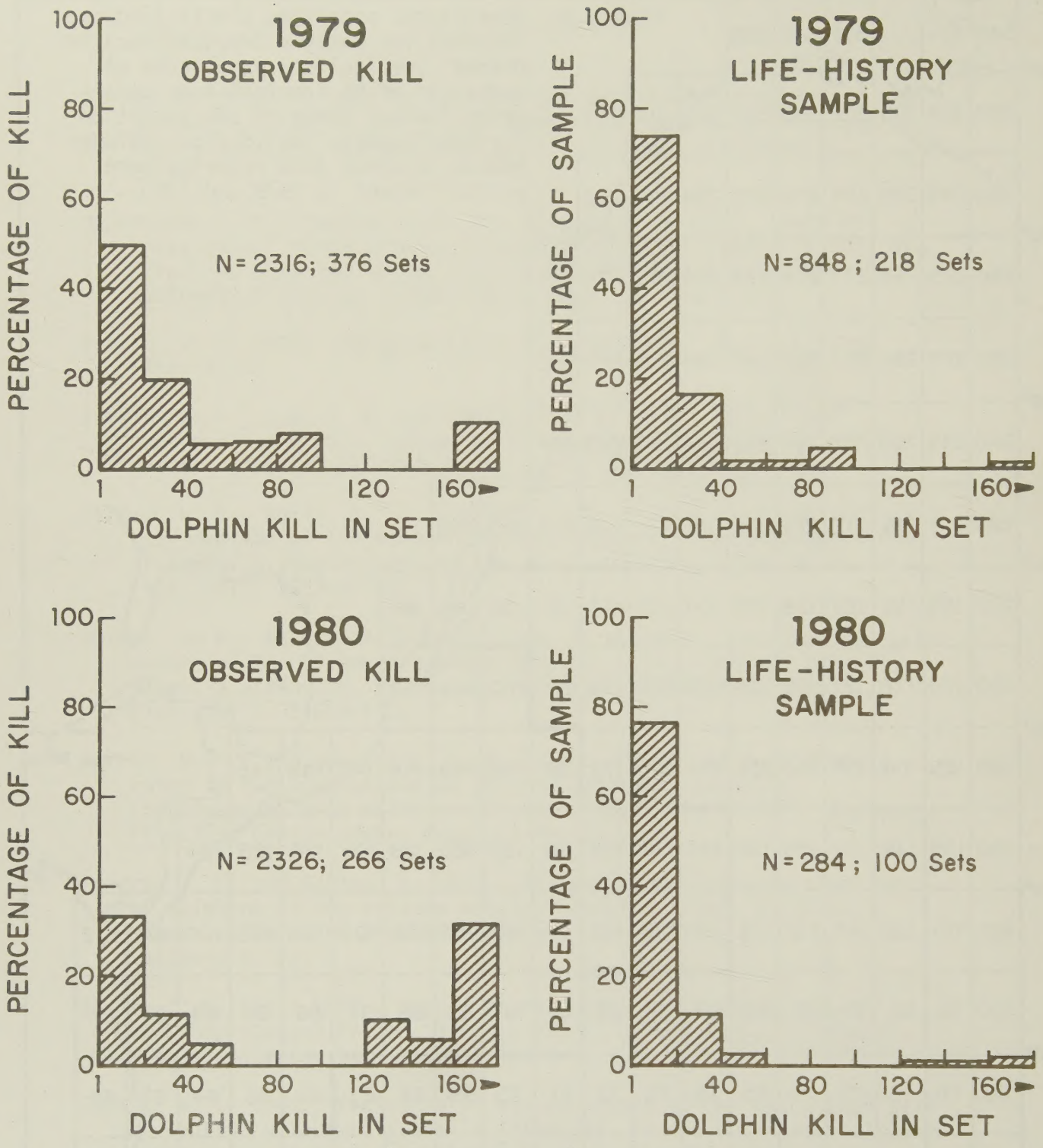

Figure 2. Comparisons of kill-size structures of observed kills with those of subsamples from which life-history data and specimens were collected; for spotted dolphin Stenella attenuata, in 1979 and 1980. Includes only data collected by NMFS technicians.

Species and Stock	5-DEG SQUARE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ALL MONTHS
SPOTTED DOLPHIN:														
Northern Offshore														
1979	83	0	0	0	1	0	0	0	0	0	0	0	0	1
	84	13	0	6	2	0	0	0	0	0	0	0	0	21
	85	24	13	0	0	0	0	0	0	0	0	0	0	37
	86	0	0	0	0	0	0	0	0	0	4	0	0	4
	87	0	0	0	0	0	0	0	0	0	1	0	0	1
	88	0	0	0	0	0	0	0	0	11	0	2	0	13
	90	0	0	0	0	4	0	0	0	0	0	0	0	4
	103	0	1	0	0	0	0	0	0	0	0	0	0	1
	104	40	0	0	4	0	0	0	0	0	0	0	0	44
	105	5	1	0	5	3	0	0	0	0	0	0	0	14
	106	40	1	16	0	0	0	0	0	0	6	0	0	63
	107	30	1	10	0	0	0	0	8	0	265	0	0	314
	108	4	0	0	0	0	0	0	7	0	10	12	0	33
	109	0	0	0	0	0	0	0	0	0	3	0	0	3
	110	0	0	0	0	7	0	0	3	0	0	1	0	11
	111	0	0	0	0	0	3	1	5	1	0	0	0	10
	112	0	0	0	12	80	2	39	0	0	0	0	0	133
	113	0	0	0	0	4	13	6	4	0	0	0	0	27
	114	0	0	0	0	0	72	2	0	0	0	0	0	74
	125	0	4	7	13	62	0	0	0	0	0	0	0	86
	126	20	29	30	1	0	0	2	0	0	0	0	0	82
	127	6	12	13	7	0	0	0	0	0	6	0	0	44
	128	69	4	16	5	4	1	0	2	15	47	0	0	163
	129	0	0	0	1	4	0	0	0	0	0	1	0	6
	130	0	0	0	3	0	0	0	1	0	0	2	0	6
	131	0	0	0	0	0	0	0	27	0	0	0	0	27
	132	0	0	0	0	0	0	12	5	0	0	0	0	17
	133	0	0	0	0	0	1	13	72	3	0	0	0	89
	134	0	0	0	0	0	30	45	2	1	0	0	0	78
	146	0	0	1	2	0	0	0	0	0	0	0	0	3
	147	0	1	0	2	2	0	30	0	1	0	0	0	36
	148	13	18	0	0	0	7	0	0	2	0	1	0	41
	149	23	0	4	6	1	3	3	0	2	2	3	0	47
	150	0	0	0	0	2	0	1	0	0	0	0	0	3
	151	0	0	0	0	20	0	0	0	0	0	0	0	20
	168	0	0	0	0	0	1	0	0	0	0	2	0	3
	170	0	0	0	0	0	0	1	0	0	0	0	0	1
	Total	287	85	103	64	193	133	155	136	36	344	24	0	1560

Table 1. Kill data for spotted dolphin, Stenella attenuata, in observed kill, 1979 and 1980; by stock, five-degree square and month of the year; data collected by NMFS observers on U.S. registered vessels.

Species and Stock	5-DEG SQUARE	JAN	FEB	MAR.	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ALL MONTHS
Northern Offshore														
1980	83	1	0	0	0	0	0	0	0	0	0	0	0	1
	84	0	0	0	0	0	0	0	0	0	6	18	0	24
	85	0	0	0	0	0	0	0	0	0	0	1	0	1
	86	0	7	0	0	0	0	0	0	0	0	0	0	7
	88	0	0	0	0	0	0	0	0	0	3	0	0	3
	89	0	0	0	0	0	0	0	0	0	6	0	0	6
	90	0	0	0	0	0	0	0	0	43	20	0	0	63
	91	0	0	0	0	0	0	0	0	2	13	0	0	15
	104	0	0	248	6	0	0	0	0	0	0	0	0	254
	105	0	0	2	1	8	0	0	0	0	0	2	15	28
	106	125	9	0	0	0	0	0	0	3	0	13	35	185
	107	10	54	3	1	0	0	0	0	0	144	3	0	215
	108	0	0	0	0	0	0	0	2	3	10	9	0	24
	109	0	0	0	0	1	0	0	0	1	0	32	0	34
	110	0	0	0	0	0	0	0	0	0	0	0	1	1
	111	0	0	0	0	0	0	0	0	0	1	0	0	1
	112	0	0	0	0	0	12	11	16	0	0	0	0	39
	113	0	0	0	0	0	8	12	1	0	0	0	0	21
	114	0	0	0	0	0	2	72	3	0	6	0	0	83
	125	5	0	0	0	0	0	0	0	0	0	0	0	5
	126	0	13	1	0	3	0	0	0	0	0	0	0	17
	127	0	4	0	0	0	0	0	0	1	0	0	0	5
	128	1	0	15	42	17	0	0	10	2	0	0	0	87
	129	2	0	15	11	0	1	0	27	1	32	8	0	97
	130	0	0	0	0	0	0	10	0	6	1	0	0	17
	131	0	0	0	0	0	0	2	17	0	8	0	0	27
	132	0	0	0	0	0	4	4	0	0	0	0	0	8
	133	0	0	0	0	0	1	0	0	4	21	0	0	26
	134	0	0	0	0	0	0	4	1	0	0	0	0	5
	147	0	2	0	0	0	0	0	0	0	0	0	0	2
	149	0	0	1	55	0	0	29	10	0	0	0	0	95
	150	0	0	0	0	1	4	2	0	40	0	0	0	47
	168	1	0	0	0	0	0	0	0	0	0	0	0	1
	169	1	0	0	0	0	0	0	0	0	0	0	0	1
	Total	146	89	285	116	30	32	146	87	106	271	86	51	1445

Table 1. Continued

Species and Stock	5-DEG SQUARE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ALL MONTHS
Southern Offshore														
1979	23	2	0	0	0	0	0	0	0	0	0	0	0	2
	24	57	0	0	0	2	0	0	0	0	0	0	0	59
	25	0	0	0	0	0	0	0	0	0	0	0	3	3
	43	9	0	0	0	0	0	0	0	0	0	0	0	9
	44	220	0	0	3	350	1	0	0	0	0	0	0	574
	45	1	0	0	0	0	0	0	0	0	0	0	17	18
	64	1	0	0	0	0	0	0	0	0	0	0	0	1
	65	4	0	0	0	0	0	0	0	0	0	0	0	4
	66	0	36	0	0	0	0	0	0	0	0	0	0	36
	Total	294	36	0	3	352	1	0	0	0	0	0	20	706
1980	23	12	9	0	0	0	0	0	0	0	0	0	0	21
	24	1	2	0	0	0	0	0	0	0	0	0	10	13
	43	165	2	1	0	0	0	0	0	0	0	0	0	168
	44	4	55	2	0	0	0	0	0	0	568	0	0	629
	45	40	0	0	0	0	0	0	0	0	0	0	0	40
	66	1	0	0	0	0	0	0	0	0	0	0	0	1
	Total	223	68	3	0	0	0	0	0	0	568	0	10	872
Coastal														
1979	168	0	0	0	40	0	0	0	0	0	0	0	0	40
Unidentified to Stock														
1979	148	0	0	0	0	0	0	0	10	0	0	0	0	10
1980	84	0	0	0	0	0	0	0	0	0	0	0	1	1
	104	0	0	0	0	0	0	0	0	0	0	0	8	8
	Total	0	0	0	0	0	0	0	0	0	0	0	9	9
All Stocks														
1979	Total	581	121	103	107	545	134	155	146	36	344	24	20	2316
1980	Total	369	157	288	116	30	32	146	87	106	839	86	70	2326

Table 1. Continued.

Species and Stock	5-DEG SQUARE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ALL MONTHS
SPINNER DOLPHIN:														
Northern Whitebelly														
1979	85	6	7	0	0	0	0	0	0	0	0	0	0	13
	86	0	0	0	0	0	0	0	0	0	1	1	0	2
	87	0	0	0	0	0	0	0	0	0	3	0	0	3
	88	0	0	0	1	0	0	0	0	0	0	0	0	1
	89	0	0	0	0	0	0	0	1	0	0	0	0	1
	90	0	0	0	0	1	0	0	0	0	0	0	0	1
	91	0	0	0	1	0	0	0	0	0	0	0	0	1
	106	0	0	4	0	0	0	0	0	0	0	0	0	4
	107	1	0	0	0	0	0	0	0	0	0	0	0	1
	108	2	0	0	3	0	0	0	0	0	2	0	0	7
	109	0	0	0	0	0	0	0	0	0	2	0	0	2
	111	0	0	0	0	0	1	2	2	0	0	0	0	5
	112	0	0	0	0	10	0	0	4	0	0	0	0	14
	113	0	0	0	0	0	2	0	7	0	0	0	0	9
	114	0	0	0	0	0	40	2	0	0	0	0	0	42
	128	1	0	0	0	0	0	0	0	2	0	0	0	3
	131	0	0	0	0	1	0	0	4	0	0	0	0	5
	132	0	0	0	0	0	0	1	3	0	0	0	0	4
	133	0	0	0	0	0	0	9	35	30	0	0	0	74
	134	0	0	0	0	0	12	267	0	0	0	0	0	279
	150	0	0	0	0	0	2	0	0	0	0	0	0	2
	151	0	0	0	0	2	0	0	0	0	0	0	0	2
	Total	10	7	4	5	14	57	281	56	32	8	1	0	475
1980	86	0	14	0	0	0	0	0	0	0	0	0	0	14
	89	0	0	0	0	0	0	0	0	0	2	0	0	2
	90	0	0	0	0	0	0	0	0	2	1	0	0	3
	91	0	0	0	0	0	0	0	0	2	1	0	0	3
	105	0	0	0	0	0	0	0	0	0	0	0	2	2
	107	7	12	0	3	0	0	0	0	0	0	0	0	22
	108	0	0	0	0	0	0	0	0	0	0	1	0	1
	109	0	0	0	0	0	0	0	0	1	0	0	0	1
	111	0	0	0	0	0	0	0	0	0	2	0	0	2
	112	0	0	0	0	0	1	2	9	0	0	0	0	12
	113	0	0	0	0	0	2	2	2	0	1	0	0	7
	114	0	0	0	0	0	2	105	0	0	11	0	0	118
	129	0	0	0	0	0	0	0	0	0	0	7	0	7
	130	0	0	0	0	0	0	4	0	0	0	0	0	4
	131	0	0	0	0	0	2	0	11	0	6	0	0	19
	132	0	0	0	0	0	0	9	0	0	0	0	0	9
	133	0	0	0	0	0	0	0	0	2	2	0	0	4
	134	0	0	0	0	0	0	0	4	0	0	0	0	4
	149	0	0	0	0	0	0	7	0	0	0	0	0	7
	150	0	0	0	0	0	0	0	0	1	0	0	0	1
	Total	7	26	0	3	0	7	129	26	8	26	8	2	242

Table 2. Kill data for spinner dolphin, Stenella longirostris, in observed kill, 1979 and 1980; by stock, five-degree square and month of the year; data collected by NMFS observers on U.S. registered vessels.

Species and Stock	5-DEG SQUARE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ALL MONTHS
Southern Whitebelly														
1979	24	11	0	0	0	0	0	0	0	0	0	0	0	11
	44	62	0	0	3	116	5	0	0	0	0	0	0	186
	45	9	0	0	0	0	0	0	0	0	0	0	0	9
	46	0	0	0	0	0	0	0	0	0	0	1	0	1
	65	8	0	0	0	0	0	0	0	0	0	0	0	8
	Total	90	0	0	3	116	5	0	0	0	0	1	0	215
1980	23	4	1	0	0	0	0	0	0	0	0	0	0	5
	43	4	0	0	0	0	0	0	0	0	0	0	0	4
	44	1	22	0	0	0	0	0	0	0	286	0	0	309
	Total	9	23	0	0	0	0	0	0	0	286	0	0	318
Eastern														
1979	107	0	0	1	0	0	0	0	0	0	0	0	0	1
	108	0	0	0	0	0	0	0	0	0	6	0	0	6
	109	0	0	0	0	0	0	0	0	0	1	0	0	1
	125	0	2	7	0	0	0	0	0	0	0	0	0	9
	126	1	10	39	0	0	0	26	0	0	0	0	0	76
	127	4	3	94	1	4	0	0	0	0	0	0	0	106
	128	11	2	0	2	1	2	0	0	20	5	0	0	43
	129	0	0	0	0	0	0	0	0	0	0	1	0	1
	133	0	0	0	0	0	0	0	1	0	0	0	0	1
	147	0	1	0	0	0	0	12	0	0	0	0	0	13
	149	0	0	0	1	0	0	0	0	0	0	0	0	1
	150	0	0	0	1	0	0	0	0	0	0	0	0	1
	Total	16	18	141	5	5	2	38	1	20	12	1	0	259
1980	86	0	5	0	0	0	0	0	0	0	0	0	0	5
	125	0	1	9	0	0	0	0	0	0	0	0	0	10
	126	0	1	1	0	3	0	0	0	0	0	0	0	5
	127	0	1	0	0	0	0	0	0	2	0	0	0	3
	128	8	0	17	3	1	0	0	8	0	0	0	0	37
	129	0	0	3	2	1	0	0	0	0	4	16	0	26
	130	0	0	0	0	0	0	0	0	4	0	0	0	4
	131	0	0	0	0	0	0	0	3	0	6	0	0	9
	147	0	3	0	0	0	0	0	0	0	0	0	0	3
	149	0	0	0	0	0	0	0	0	7	1	0	0	8
	Total	8	11	30	5	5	0	0	11	13	11	16	0	110

Table 2. Continued.

Species and Stock	5-DEG SQUARE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ALL MONTHS
Unidentified to Stock														
1979	107	3	0	0	0	0	0	0	0	0	0	0	0	3
	108	0	0	0	0	0	0	0	0	0	1	0	0	1
	113	0	0	0	0	0	1	0	0	0	0	0	0	1
	114	0	0	0	0	0	2	0	0	0	0	0	0	2
	126	0	0	1	0	0	0	0	0	0	0	0	0	1
	128	0	0	0	0	0	0	0	0	64	1	0	0	65
	133	0	0	0	0	0	0	1	0	0	0	0	0	1
	148	0	0	0	0	0	0	0	0	0	0	3	0	3
	168	0	0	0	0	0	0	0	0	0	0	1	0	1
	Total	3	0	1	0	0	3	1	0	64	2	4	0	78
1980	114	0	0	0	0	0	0	3	0	0	0	0	0	3
	128	0	0	0	0	0	0	0	2	0	0	0	0	2
	129	0	0	0	0	0	0	0	2	0	5	21	0	28
	130	0	0	0	0	0	0	1	0	0	0	0	0	1
	131	0	0	0	0	0	0	0	5	0	4	0	0	9
	132	0	0	0	0	0	2	2	0	0	0	0	0	4
	150	0	0	0	0	0	0	0	0	1	0	0	0	1
	Total	0	0	0	0	0	2	6	9	1	9	21	0	48
All Stocks														
1979	Total	119	25	146	13	135	67	320	57	116	22	7	0	1027
1980	Total	24	60	30	8	5	9	135	46	22	332	45	2	718

Table 2. Continued.

Species and Stock	5-DEG SQUARE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ALL MONTHS
COMMON DOLPHIN:														
Baja Neritic														
1979	168	0	0	147	490	0	0	0	0	0	0	0	0	637
	169	0	0	0	35	0	0	0	0	0	0	0	0	35
	Total	0	0	147	525	0	0	0	0	0	0	0	0	672
1980	169	13	0	0	0	0	0	0	0	0	0	0	0	13
	189	0	0	0	0	1	0	0	0	0	0	0	0	1
	Total	13	0	0	0	1	0	0	0	0	0	0	0	14
Northern Tropical														
1979	168	2	7	130	13	0	0	0	0	0	0	0	0	152
	169	3	0	0	0	0	0	0	0	0	0	0	0	3
	Total	5	7	130	13	0	0	0	0	0	0	0	0	155
1980	168	6	0	0	0	0	0	0	0	0	0	0	0	6
Central Tropical														
1979	103	14	0	0	0	96	0	0	0	0	0	0	0	110
	104	39	127	178	89	0	0	0	0	0	0	0	0	433
	105	3	0	25	0	0	0	0	0	0	0	0	0	28
	106	0	5	16	0	0	0	0	0	0	0	0	0	21
	125	0	23	0	0	4	0	0	0	0	0	0	0	27
	126	0	9	0	0	0	0	0	0	0	0	0	0	9
	134	0	0	0	0	0	16	0	0	0	0	0	0	16
	Total	56	164	219	89	100	16	0	0	0	0	0	0	644
1980	104	0	0	0	1	0	0	0	0	0	0	0	0	1
	105	0	0	0	0	18	0	0	0	22	2	0	0	42
	Total	0	0	0	1	18	0	0	0	22	2	0	0	43
Southern Tropical														
1979	44	0	0	0	0	1	0	0	0	0	0	0	0	1
All Stocks														
1979	Total	61	171	496	627	101	16	0	0	0	0	0	0	1472
1980	Total	19	0	0	1	19	0	0	0	22	2	0	0	63

Table 3. Kill data for common dolphin, Delphinus delphis, in observed kill, 1979 and 1980; by stock, five-degree square and month of the year; data collected by NMFS observers on U.S. registered vessels.

Species and Stock	5-DEG SQUARE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ALL MONTHS
STRIPED DOLPHIN:														
Northern Tropical														
1979	168	0	0	55	2	0	0	0	0	0	0	0	0	57
1980	168	17	0	0	0	0	0	0	0	0	0	0	0	17
Central Tropical														
1979	124	0	0	0	0	0	0	0	0	0	7	0	0	7
	125	0	0	0	18	0	0	0	0	0	0	0	0	18
	Total	0	0	0	18	0	0	0	0	0	7	0	0	25
All Stocks														
1979	Total	0	0	55	20	0	0	0	0	0	7	0	0	82
1980	Total	17	0	0	0	0	0	0	0	0	0	0	0	17

Table 4. Kill data for striped dolphin, Stenella coeruleoalba, in observed kill, 1979 and 1980; by stock, five-degree square and month of the year; data collected by NMFS observers on U.S. registered vessels.

Species	5-DEG SQUARE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ALL MONTHS
Bottlenosed dolphin														
1979	126	0	1	0	0	0	0	0	0	0	0	0	0	1
	107	0	0	0	0	0	0	0	0	0	1	0	0	1
	Total	0	1	0	0	0	0	0	0	0	1	0	0	2
Pacific white-sided dolphin														
1979	189	0	0	0	0	0	0	0	1	0	0	0	0	1
False killer whale														
1980	126	0	1	0	0	0	0	0	0	0	0	0	0	1

Table 5. Kill data for bottlenosed dolphin, Tursiops truncatus, Pacific white-sided dolphin, Lagenorhyncus obliquidens, and false killer whale, Pseudorca crassidens, in observed kill, 1979 and 1980; by five-degree square and month of the year; data collected by NMFS observers on U.S.-registered vessels.

Species and Stock	5-DEG SQUARE	QUARTER 1 M	F	TOTAL	QUARTER 2 M	F	TOTAL	QUARTER 3 M	F	TOTAL	QUARTER 4 M	F	TOTAL	ALL QUARTERS M	F	TOTAL
SPOTTED DOLPHIN:																
Northern Offshore																
	66	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1
1979	82	0	0	0	0	0	0	7	9	16	0	0	0	7	9	16
	85	4	9	13	0	0	0	0	0	0	0	0	0	4	9	13
	86	0	0	0	0	0	0	1	0	1	7	16	23	8	16	24
	87	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1
	88	0	0	0	0	0	0	4	4	8	0	1	1	4	5	9
	90	0	0	0	3	0	3	0	1	1	0	0	0	3	1	4
	104	0	1	1	4	0	4	0	0	0	0	0	0	4	1	5
	105	2	4	6	1	6	7	0	0	0	0	0	0	3	10	13
	106	5	19	24	0	0	0	5	5	10	3	2	5	13	26	39
	107	11	10	21	0	0	0	2	4	6	35	55	90	48	69	117
	108	1	3	4	0	0	0	0	0	0	18	27	45	19	30	49
	109	1	8	9	0	0	0	0	0	0	1	1	2	2	9	11
	110	0	0	0	2	0	2	2	1	3	2	5	7	6	6	12
	111	0	0	0	1	0	1	1	0	1	0	0	0	2	0	2
	112	0	0	0	7	12	19	7	11	18	5	5	10	19	28	47
	113	0	0	0	2	5	7	7	8	15	6	2	8	15	15	30
	114	0	0	0	22	26	48	2	1	3	2	9	11	26	36	62
	125	5	5	10	34	29	63	1	0	1	0	0	0	40	34	74
	126	14	23	37	0	1	1	8	3	11	0	0	0	22	27	49
	127	15	27	42	2	3	5	0	0	0	0	3	3	17	33	50
	128	30	28	58	7	23	30	2	3	5	10	18	28	49	72	121
	129	0	0	0	0	4	4	0	0	0	2	7	9	2	11	13
	130	0	0	0	0	0	0	0	0	0	6	10	16	6	10	16
	131	0	0	0	0	0	0	0	0	0	3	0	3	3	0	3
	132	0	0	0	0	0	0	9	9	18	0	8	8	9	17	26
	133	0	0	0	0	0	0	18	29	47	1	2	3	19	31	50
	134	0	0	0	9	18	27	3	5	8	0	0	0	12	23	35
	146	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1
	147	0	0	0	1	1	2	0	0	0	0	0	0	1	1	2
	148	4	8	12	0	3	3	6	6	12	0	1	1	10	18	28
	149	2	3	5	6	7	13	3	0	3	0	5	5	11	15	26
	150	0	0	0	1	1	2	0	1	1	4	1	5	5	3	8
	151	0	0	0	3	8	11	0	0	0	0	0	0	3	8	11
	168	0	0	0	0	0	0	0	0	0	4	2	6	4	2	6
	Total	94	149	243	105	147	252	89	100	189	109	181	290	397	577	974

Table 6. Sex data for spotted dolphin, Stenella attenuata, in observed kill, 1979 and 1980; by stock, five-degree square and quarter of the year; data collected by IATTC and NMFS observers on U.S.-registered vessels.

Species and Stock	5-DEG SQUARE	QUARTER 1 M	F	TOTAL	QUARTER 2 M	F	TOTAL	QUARTER 3 M	F	TOTAL	QUARTER 4 M	F	TOTAL	ALL QUARTERS M	F	TOTAL
Northern Offshore																
1980	66	1	1	2	0	0	0	0	0	0	0	0	0	1	1	2
	83	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1
	85	1	0	1	3	1	4	0	1	1	14	10	24	18	12	30
	86	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1
	87	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1
	88	10	12	22	0	0	0	0	0	0	0	0	0	10	12	22
	89	2	5	7	0	0	0	0	0	0	2	2	4	4	7	11
	90	4	0	4	0	0	0	3	4	7	5	12	17	12	16	28
	91	2	0	2	0	0	0	0	0	0	6	4	10	8	4	12
	104	15	15	30	4	2	6	0	0	0	0	0	0	19	17	36
	105	3	2	5	0	1	1	0	0	0	4	8	12	7	11	18
	106	13	19	32	0	0	0	0	0	0	7	12	19	20	31	51
	107	11	20	31	1	0	1	2	1	3	24	24	48	38	45	83
	108	1	0	1	0	0	0	10	22	32	3	5	8	14	27	41
	109	0	0	0	0	0	0	0	1	1	1	12	13	1	13	14
	111	0	0	0	0	0	0	1	6	7	1	3	4	2	9	11
	112	0	0	0	4	9	13	21	38	59	0	0	0	25	47	72
	113	0	0	0	3	3	6	10	11	21	1	3	4	14	17	31
	114	0	0	0	3	0	3	2	6	8	2	2	4	7	8	15
	125	7	7	14	2	3	5	0	0	0	0	0	0	9	10	19
	126	1	6	7	0	0	0	0	0	0	0	0	0	1	6	7
	127	1	3	4	9	3	12	0	0	0	0	0	0	10	6	16
	128	3	10	13	24	27	51	8	11	19	0	0	0	35	48	83
	129	7	7	14	2	3	5	8	13	21	6	12	18	23	35	58
	130	0	0	0	0	0	0	12	22	34	1	1	2	13	23	36
	131	0	0	0	0	0	0	13	6	19	0	0	0	13	6	19
	132	0	0	0	1	0	1	16	12	28	0	1	1	17	13	30
	133	0	0	0	1	0	1	4	9	13	3	1	4	8	10	18
	134	0	0	0	0	0	0	1	1	2	0	0	0	1	1	2
	148	0	0	0	0	7	7	0	0	0	0	0	0	0	7	7
	149	0	0	0	17	19	36	1	2	3	0	0	0	18	21	39
	150	0	0	0	1	0	1	2	7	9	0	0	0	3	7	10
	169	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1
	Total	82	109	191	75	78	153	115	173	288	80	113	193	352	473	825

Table 6. Continued.

Species and Stock	5-DEG SQUARE	QUARTER 1 M	F	TOTAL	QUARTER 2 M	F	TOTAL	QUARTER 3 M	F	TOTAL	QUARTER 4 M	F	TOTAL	ALL QUARTERS M	F	TOTAL
Southern Offshore																
1979	23	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1
	24	9	10	19	1	1	2	0	0	0	0	0	0	10	11	21
	25	0	0	0	0	0	0	0	0	0	2	1	3	2	1	3
	43	6	5	11	0	0	0	0	0	0	0	0	0	6	5	11
	44	36	27	63	80	90	170	4	2	6	2	2	4	122	121	243
	45	0	0	0	0	0	0	0	0	0	1	4	5	1	4	5
	64	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1
	66	13	15	28	0	0	0	0	0	0	0	0	0	13	15	28
	Total	64	58	122	81	91	172	4	2	6	5	8	13	154	159	313
1980	23	2	4	6	0	0	0	0	0	0	0	0	0	2	4	6
	24	0	1	1	0	0	0	0	0	0	4	3	7	4	4	8
	43	19	11	30	0	0	0	0	0	0	0	0	0	19	11	30
	44	8	11	19	0	0	0	0	0	0	5	1	6	13	12	25
	45	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1
	67	19	26	45	0	0	0	0	0	0	0	0	0	19	26	45
	Total	48	54	102	0	0	0	0	0	0	9	4	13	57	58	115
Coastal																
1979	147	0	0	0	2	5	7	0	0	0	0	0	0	2	5	7
	168	0	0	0	4	8	12	0	0	0	0	0	0	4	8	12
	Total	0	0	0	6	13	19	0	0	0	0	0	0	6	13	19
All Stocks																
1979	Total	158	207	365	192	251	443	93	102	195	114	189	303	557	749	1306
1980	Total	130	163	293	75	78	153	115	173	288	89	117	206	409	531	940

Table 6. Continued.

Species and Stock	5-DEG SQUARE	QUARTER 1 M	F	TOTAL	QUARTER 2 M	F	TOTAL	QUARTER 3 M	F	TOTAL	QUARTER 4 M	F	TOTAL	ALL QUARTERS M	F	TOTAL
SPINNER DOLPHIN:																
Northern Whitebelly																
1979	85	3	1	4	0	0	0	0	0	0	0	0	0	3	1	4
	86	0	0	0	0	0	0	0	0	0	1	1	2	1	1	2
	91	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1
	106	2	2	4	0	0	0	0	0	0	0	0	0	2	2	4
	108	2	0	2	1	1	2	0	0	0	1	3	4	4	4	8
	110	0	0	0	0	0	0	0	0	0	1	2	3	1	2	3
	111	0	0	0	1	0	1	0	0	0	0	0	0	1	0	1
	112	0	0	0	0	0	0	2	2	4	0	0	0	2	2	4
	113	0	0	0	0	1	1	3	4	7	0	0	0	3	5	8
	114	0	0	0	18	18	36	0	2	2	1	0	1	19	20	39
	126	0	2	2	0	0	0	0	0	0	0	0	0	0	2	2
	128	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1
	132	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1
	133	0	0	0	0	0	0	20	18	38	0	0	0	20	18	38
	134	0	0	0	4	7	11	0	0	0	0	0	0	4	7	11
	150	0	0	0	0	2	2	0	0	0	0	0	0	0	2	2
	Total	7	6	13	24	30	54	25	27	52	4	6	10	60	69	129
1980	85	0	0	0	0	0	0	2	0	2	31	49	80	33	49	82
	88	3	2	5	0	0	0	0	0	0	0	0	0	3	2	5
	89	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1
	90	0	0	0	0	0	0	1	0	1	0	1	1	1	1	2
	91	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1
	107	2	6	8	1	0	1	0	0	0	0	0	0	3	6	9
	108	0	0	0	0	0	0	3	1	4	0	0	0	3	1	4
	109	0	0	0	0	0	0	0	1	1	1	1	2	1	2	3
	111	0	0	0	0	0	0	3	2	5	1	0	1	4	2	6
	112	0	0	0	2	0	2	3	3	6	0	0	0	5	3	8
	113	0	0	0	0	1	1	1	4	5	0	0	0	1	5	6
	114	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1
	128	2	0	2	0	0	0	0	0	0	0	0	0	2	0	2
	129	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1
	130	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1
	131	0	0	0	0	2	2	5	3	8	0	0	0	5	5	10
	132	0	0	0	0	0	0	5	5	10	0	0	0	5	5	10
	133	0	0	0	0	0	0	6	10	16	0	0	0	6	10	16
	134	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1
	Total	7	8	15	3	3	6	32	29	61	33	54	87	75	94	169

Table 7. Sex data for spinner dolphin, Stenella longirostris, in observed kill, 1979 and 1980; by stock, five-degree square and quarter of the year; data collected by IATTC and NMFS observers on U.S.-registered vessels.

Species and Stock	5-DEG SQUARE	QUARTER 1 M	F	TOTAL	QUARTER 2 M	F	TOTAL	QUARTER 3 M	F	TOTAL	QUARTER 4 M	F	TOTAL	ALL QUARTERS M	F	TOTAL
Southern Whitebelly																
1979	24	4	3	7	0	0	0	0	0	0	0	0	0	4	3	7
	44	12	10	22	19	13	32	0	0	0	2	0	2	33	23	56
	45	2	3	5	0	0	0	0	0	0	0	0	0	2	3	5
	Total	18	16	34	19	13	32	0	0	0	2	0	2	39	29	68
1980	23	17	12	29	0	0	0	0	0	0	0	0	0	17	12	29
	43	1	1	2	0	0	0	0	0	0	0	0	0	1	1	2
	44	5	3	8	0	0	0	0	0	0	6	4	10	11	7	18
	66	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1
	67	2	1	3	0	0	0	0	0	0	0	0	0	2	1	3
	Total	26	17	43	0	0	0	0	0	0	6	4	10	32	21	53
Eastern																
1979	106	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1
	107	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1
	108	0	0	0	0	0	0	0	0	0	1	8	9	1	8	9
	109	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
	110	0	0	0	0	0	0	0	0	0	1	1	2	1	1	2
	125	5	6	11	0	1	1	0	0	0	0	0	0	5	7	12
	126	13	16	29	0	0	0	6	4	10	0	0	0	19	20	39
	127	33	25	58	0	2	2	5	1	6	0	0	0	38	28	66
	128	11	12	23	2	1	3	3	5	8	4	5	9	20	23	43
	130	0	0	0	0	0	0	0	0	0	7	5	12	7	5	12
	131	5	8	13	0	0	0	1	0	1	1	0	1	7	8	15
	132	0	0	0	0	0	0	0	0	0	3	6	9	3	6	9
	133	0	0	0	0	0	0	1	0	1	1	1	2	2	1	3
	146	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1
	Total	67	68	135	2	4	6	18	10	28	19	26	45	106	108	214
1980	109	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
	125	3	3	6	0	0	0	0	0	0	0	0	0	3	3	6
	126	5	2	7	2	0	2	0	0	0	0	0	0	7	2	9
	127	0	3	3	0	1	1	0	0	0	0	0	0	0	4	4
	128	3	10	13	1	1	2	6	6	12	0	0	0	10	17	27
	129	0	1	1	2	2	4	0	0	0	6	4	10	8	7	15
	130	0	0	0	0	0	0	3	5	8	1	1	2	4	6	10
	131	0	0	0	0	0	0	3	0	3	0	0	0	3	0	3
	132	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1
	133	0	0	0	0	0	0	2	0	2	0	0	0	2	0	2
	149	0	0	0	0	0	0	3	2	5	0	0	0	3	2	5
	Total	11	19	30	5	4	9	17	14	31	8	5	13	41	42	83

Table 7. Continued.

Species and Stock	5-DEG SQUARE	QUARTER 1 M	F	TOTAL	QUARTER 2 M	F	TOTAL	QUARTER 3 M	F	TOTAL	QUARTER 4 M	F	TOTAL	ALL QUARTERS M	F	TOTAL
Unidentified to Stock																
1979	107	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1
	130	0	0	0	0	0	0	0	0	0	1	1	2	1	1	2
	132	0	0	0	0	0	0	0	0	0	0	2	2	0	2	2
	133	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1
	168	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
	Total	0	0	0	0	0	0	0	0	0	2	5	7	2	5	7
1980	128	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1
	129	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
	131	0	0	0	0	0	0	2	3	5	0	1	1	2	4	6
	132	0	0	0	0	0	0	2	0	2	0	0	0	2	0	2
	133	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1
	Total	0	0	0	0	1	1	5	3	8	1	1	2	6	5	11
All Stocks																
1979	Total	92	90	182	45	47	92	43	37	80	27	37	64	207	211	418
1980	Total	44	44	88	8	8	16	54	46	100	48	64	112	154	162	316

Table 7. Continued

Species and Stock	5-DEG SQUARE	QUARTER 1 M	F	TOTAL	QUARTER 2 M	F	TOTAL	QUARTER 3 M	F	TOTAL	QUARTER 4 M	F	TOTAL	ALL QUARTERS M	F	TOTAL
COMMON DOLPHIN:																
Baja Neritic																
1979	168	4	9	13	16	21	37	0	0	0	0	0	0	20	30	50
1980	169	2	4	6	0	0	0	0	0	0	0	0	0	2	4	6
Northern Tropical																
1979	168	30	28	58	5	3	8	0	0	0	0	0	0	35	31	66
	169	1	1	2	0	0	0	0	0	0	0	0	0	1	1	2
	Total	31	29	60	5	3	8	0	0	0	0	0	0	36	32	68
1980	168	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1
	169	6	6	12	0	0	0	0	0	0	0	0	0	6	6	12
	Total	7	6	13	0	0	0	0	0	0	0	0	0	7	6	13
Central Tropical																
1979	103	10	4	14	3	3	6	0	0	0	0	0	0	13	7	20
	104	20	27	47	37	45	82	0	0	0	0	0	0	57	72	129
	105	0	3	3	0	0	0	0	0	0	0	0	0	0	3	3
	106	6	7	13	0	2	2	0	0	0	0	0	0	6	9	15
	125	3	3	6	7	11	18	0	0	0	0	0	0	10	14	24
	126	7	2	9	0	0	0	0	0	0	0	0	0	7	2	9
	134	0	0	0	1	2	3	0	0	0	0	0	0	1	2	3
	Total	46	46	92	48	63	111	0	0	0	0	0	0	94	109	203
1980	104	0	0	0	1	0	1	0	0	0	0	0	0	1	0	1
	105	0	0	0	4	11	15	0	0	0	0	0	0	4	11	15
	Total	0	0	0	5	11	16	0	0	0	0	0	0	5	11	16
Southern Tropical																
1979	64	3	4	7	0	0	0	0	0	0	0	0	0	3	4	7
All Stocks																
1979	Total	84	88	172	69	87	156	0	0	0	0	0	0	153	175	328
1980	Total	9	10	19	5	11	16	0	0	0	0	0	0	14	21	35

Table 8. Sex data for common dolphin, Delphinus delphis, in observed kill, 1979 and 1980; by stock, five-degree square and quarter of the year; data collected by NMFS observers on U.S. registered vessels.

Species and Stock	5-DEG SQUARE	QUARTER 1 M	F	TOTAL	QUARTER 2 M	F	TOTAL	QUARTER 3 M	F	TOTAL	QUARTER 4 M	F	TOTAL	ALL QUARTERS M	F	TOTAL
STRIPED DOLPHIN:																
Northern Tropical																
1979	168	14	12	26	1	5	6	0	0	0	0	0	0	15	17	32
1980	149	0	0	0	11	4	15	0	0	0	0	0	0	11	4	15
	168	1	8	9	0	0	0	0	0	0	0	0	0	1	8	9
	Total	1	8	9	11	4	15	0	0	0	0	0	0	12	12	24
Central Tropical																
1979	124	0	0	0	0	1	1	0	0	0	1	2	3	1	3	4
	125	0	0	0	5	0	5	0	0	0	0	0	0	5	0	5
	Total	0	0	0	5	1	6	0	0	0	1	2	3	6	3	9
All Stocks																
1979	Total	14	12	26	6	6	12	0	0	0	1	2	3	21	20	41
1980	Total	1	8	9	11	4	15	0	0	0	0	0	0	12	12	24

Table 9. Sex data for striped dolphin, Stenella coeruleoalba, in observed kill, 1979 and 1980; by stock, five-degree square and quarter of the year; data collected by NMFS observers on U.S. registered vessels.

Species	5-DEG SQUARE	QUARTER 1 M	F	TOTAL	QUARTER 2 M	F	TOTAL	QUARTER 3 M	F	TOTAL	QUARTER 4 M	F	TOTAL	ALL QUARTERS M	F	TOTAL
Bottlenosed dolphin																
1979	107	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
	126	1	1	2	0	0	0	0	0	0	0	0	0	1	1	2
	Total	1	1	2	0	0	0	0	0	0	1	0	1	2	1	3
Rough-toothed dolphin																
1979	124	0	0	0	0	0	0	1	3	4	0	0	0	1	3	4
Pacific white-sided dolphin																
1979	189	0	0	0	0	0	0	1	1	2	0	0	0	1	1	2
False killer whale																
1980	126	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1

Table 10. Sex data for bottlenosed dolphin, Tursiops truncatus, rough-toothed dolphin, Steno bredanensis, Pacific white-sided dolphin, Lagenorhyncus obliquidens, and false killer whale, Pseudorca crassidens, in observed kill, 1979 and 1980; by five degree square and quarter of the year; data collected by IATTC and NMFS observers on U.S.-registered vessels.

Length (cm)	Spotted dolphins										Striped dolphins					
	Northern Offshore				Southern Offshore				Coastal		Central Tropical		Northern Tropical			
	1979		1980		1979		1980		1979		1979		1979		1980	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
75-79		1														
80-84	3					1										
85-89	3	3		3	3	1										
90-94	4	3	2		4	7			1							
95-99	2	8	4	4	4	3		1	1	1						
100-104	2	2		3	3		1			1						
105-109	1	5	5	5		2										
110-114	1	2	2	3	2									1		
115-119	3	2	3	2		1		1								
120-124	5	3	2	2			1					1				
125-129	3	4	5	5	3	2	1									
130-134	4	3	4	3	3		1									
135-139	6	12	8	5	2	1										
140-144	7	11	6	5	2	4										
145-149	8	12	11	5	4	3	1	1								1
150-154	7	18	16	8	6	3	1	2	1							
155-159	24	13	24	20	10	8	2	2								
160-164	36	34	31	31	12	7	2	3						1		
165-169	30	36	32	37	8	9	5	2								
170-174	35	32	23	35	8	18	5	3	1							
175-179	23	50	29	37	18	11	4	5	1				1	2		
180-184	23	69	18	54	11	25	10	5				1	1	1	1	
185-189	22	96	23	75	9	25	7	16			1		1	1	1	
190-194	23	91	30	81	9	15	5	11			1			1	1	3
195-199	42	50	29	44	8	7	4	5	1	1	1		1	3	2	2
200-204	26	16	21	14	13	2	6	1		2		1	3	3	4	3
205-209	28	2	19	2	5	1	1	1					2	2	2	2
210-214	18	1	9	2	5	1					1		3	2	1	1
215-219	7		7	2			1			1	1					
220-224	2		3	1	1					1	1		2			
225-229	2		2										1			
230-234										1						
235-239																
240-244										1						
Total	400	579	368	488	153	157	58	59	6	9	6	3	15	17	12	12

Table 11. Length frequencies for spotted dolphins, Stenella attenuata, and striped dolphins, Stenella coeruleoalba, in the observed kill, 1979 and 1980; by stock, year, and sex; data collected by IATTC and NMFS observers on U.S.-registered vessels.

Length (cm)	Northern Whitebelly 1979		Northern Whitebelly 1980		Southern Whitebelly 1979		Southern Whitebelly 1980		Eastern 1979		Eastern 1980		Unidentified 1979		Unidentified 1980	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
75-79																
80-84	1	1		1												
85-89					2	1				1						
90-94														1		
95-99							2				1					
100-104									1					1		
105-109				1				1				1	1			1
110-114									1	2						
115-119					4				2		1					
120-124	2	2	3	1					4	3		2				
125-129		2	1	2			1		2	3		1				
130-134	4	2	2				1	1		2						1
135-139	1		2	5	2				5	3	1	1				1
140-144	1		1		1			1	3	5		2			1	
145-149	4	2	3	1			2		7	5	2				1	
150-154	3	2	4	6	3		1	1	10	8	5	5		2		
155-159	4	2	3	5		3			13	11	3	5	1	1	2	2
160-164	3	13	2	7	4	2	3	1	13	12	5	4				
165-169	2	6	9	13	1	4	2	4	7	15	6	4				
170-174	5	11	13	20	3	5	7	2	16	18	6	6			1	
175-179	13	12	16	17	5	6	3	4	10	14	7	9			1	
180-184	8	7	10	13	11	4	2		13	9	1	2				
185-189	4	4	7	5	2	4	6	3	4		2					
190-194	5	2	2		1			3			1					
195-199		1					2									
200-204			1													
205-209							1									
210-214																
215-219																
220-224																
225-229																
230-234																
235-239							1									
Total	60	69	79	97	39	29	34	21	111	111	41	42	2	5	6	5

Table 12. Length frequencies for spinner dolphins, Stenella longirostris, in the observed kill, 1979 and 1980; by stock, year, and sex; data collected by IATTC and NMFS observers on U.S.-registered vessels.

Length (cm)	Baja Neritic 1979		Baja Neritic 1980		Northern Tropical 1979		Northern Tropical 1980		Southern Tropical 1979		Central Tropical 1979		Central Tropical 1980	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
75-79														
80-84														
85-89														
90-94											2	1		
95-99														
100-104											1	1		1
105-109														
110-114														
115-119														1
120-124													1	
125-129														
130-134												1		
135-139					1				1					
140-144												1		
145-149					2	2					1			
150-154	1			1		1					2			
155-159	2	1			1				1		4	2		1
160-164		1			2	4			1		1	5		1
165-169	1	1				1	1	1		1	5	5		
170-174	2	5			1	2	1	1		1	6	11		1
175-179	2	11		2	1	7	3	1			4	7		
180-184	4	4			3	8		2		2	8	5		
185-189	2	5			9	3					10	9	1	
190-194	2	2	1	1	6	4					10	20		3
195-199	2		1		7		1				9	20		1
200-204	2				3		1				7	10	1	2
205-209											9	7	1	
210-214											9	2		
215-219											5			
220-224											3		1	
225-229														
230-234														
235-239														
Total	20	30	2	4	36	32	7	5	3	4	94	109	5	11

Table 13. Length frequencies for common dolphins, Delphinus delphis, in the observed kill, 1979 and 1980; by stock, year, and sex; data collected by IATTC and NMFS observers on U.S.-registered vessels.

	Spotted								Striped	
	Northern Offshore 1979		Northern Offshore 1980		Southern Offshore 1979		Southern Offshore 1980		Northern Tropical 1979	
	N	%	N	%	N	%	N	%	N	%
Maturity undetermined	247	42.8	237	49.2	81	51.7	35	60.4	2	11.8
Sexually immature	123	21.2	105	21.8	17	10.8	6	10.3	8	47.0
Sexually mature:										
Condition undetermined	2	0.3	1	0.2	0	0.0	0	0.0	0	0.0
Pregnant only	42	7.3	30	6.2	9	5.7	6	10.3	0	0.0
Pregnant and lactating	17	2.9	9	1.9	1	0.6	0	0.0	0	0.0
Lactating only	117	20.2	75	15.6	28	17.8	8	13.8	3	17.6
"Resting"										
With corpus luteum	7	1.2	6	1.2	10	6.4	0	0.0	0	0.0
Without corpus luteum	21	3.6	19	3.9	10	6.4	3	5.2	4	23.6
Post-reproductive	3	0.5	0	0.0	1	0.6	0	0.0	0	0.0
Total	579	100.0	482	100.0	157	100.0	58	100.0	17	100.0

Table 14. Reproductive condition for 1276 female spotted dolphins, Stenella attenuata, and 17 female striped dolphins, Stenella coeruleoalba, in the observed kill, 1979 and 1980; by stock and year; data collected by IATTC and NMFS observers on U.S.-registered vessels.

	Eastern				Whitebelly							
					Northern				Southern			
	1979		1980		1979		1980		1979		1980	
	N	%	N	%	N	%	N	%	N	%	N	%
Maturity undetermined	43	38.8	21	50.0	18	26.1	61	62.9	18	62.1	14	66.6
Sexually immature	36	32.4	12	28.6	20	29.1	19	19.6	6	20.7	3	14.3
Sexually mature:												
Condition undetermined	0	0.0	0	0.0	1	1.4	0	0.0	0	0.0	1	4.8
Pregnant only	14	12.6	4	9.5	4	5.8	2	2.1	3	10.3	0	0.0
Pregnant and lactating	0	0.0	0	0.0	1	1.4	1	1.0	0	0.0	0	0.0
Lactating only	15	13.5	5	11.9	12	17.4	10	10.3	2	6.9	3	14.3
"Resting"												
With corpus luteum	0	0.0	0	0.0	6	8.7	0	0.0	0	0.0	0	0.0
Without corpus luteum	3	2.7	0	0.0	7	10.1	4	4.1	0	0.0	0	0.0
Post-reproductive	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	111	100.0	42	100.0	69	100.0	97	100.0	29	100.0	21	100.0

Table 15. Reproductive condition for 369 female spinner dolphins, Stenella longirostris, in the observed kill, 1979 and 1980; by stock and year; data collected by IATTC and NMFS observers on U.S.-registered vessels.

	Baja Neritic 1979		Northern Tropical 1979		Southern Tropical 1979		Southern Tropical 1980		Central Tropical 1979		Central Tropical 1980	
	N	%	N	%	N	%	N	%	N	%	N	%
Maturity undetermined	20	66.7	20	62.6	0	0.0	0	0.0	33	30.9	0	0.0
Sexually immature	2	6.7	3	9.4	2	50.0	2	50.0	31	29.0	5	45.4
Sexually mature:												
Condition undetermined	0	0.0	0	0.0	0	0.0	0	0.0	1	0.9	0	0.0
Pregnant only	2	6.7	1	3.1	0	0.0	0	0.0	7	6.5	1	9.1
Pregnant and lactating	0	0.0	1	3.1	0	0.0	0	0.0	4	3.7	0	0.0
Lactating only	4	13.3	6	18.7	2	50.0	2	50.0	22	20.6	4	36.4
"Resting"												
With corpus luteum	1	3.3	1	3.1	0	0.0	0	0.0	3	2.8	0	0.0
Without corpus luteum	1	3.3	0	0.0	0	0.0	0	0.0	6	5.6	1	9.1
Post-reproductive	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	30	100.0	32	100.0	4	100.0	4	100.0	107	100.0	11	100.0

Table 16. Reproductive condition for 188 female common dolphins, Delphinus delphis, in the observed kill, 1979 and 1980; by stock and year; data collected by IATTC and NMFS observers on U.S.-registered vessels.

	SPINNER DOLPHIN		COMMON DOLPHIN		STRIPED DOLPHIN	
	OVERALL KILL	LIFE-HISTORY SAMPLE	OVERALL KILL	LIFE-HISTORY SAMPLE	OVERALL KILL	LIFE-HISTORY SAMPLE
Total sets	285	149	83	47	13	8
Total dolphins	1745	389	1535	289	99	30
	(% of kill)	(% of sample)	(% of kill)	(% of sample)	(% of kill)	(% of sample)
Kill in set:						
1-19	42.7	86.6	22.9	57.4	73.7	93.3
20-39	10.7	6.7	10.0	12.8	26.3	6.7
40-59	2.9	2.8	15.1	21.8		
60-79	6.9		4.6			
80-99	5.1	1.3	11.5	1.7		
100-119			7.4	6.2		
120-139						
140-159						
>160	31.7	2.6	28.5			
Total	100.0	100.0	100.0	100.0	100.0	100.0

Table 17. Comparisons of kill-size structures of observed kill with those of subsamples for which life-history data and specimens were collected (same analysis as in Figure 2): for spinner dolphin, Stenella longirostris; common dolphin, Delphinus delphis; and striped dolphin, S. coeruleoalba; 1979 and 1980 combined. Includes only data collected by NMFS observers.

APPENDIX 1

Form used by NMFS technicians to collect incidental-kill data aboard commercial tuna purse-seiners.

NOAA FORM 88-124
FSW 34 11-78

1979 MARINE MAMMAL SET LOG
TALLY SHEET

CRUISE # _____ NOAA - U.S. DEPT. OF COMM.

SET # _____ **Page 5**

| SPOTTED | | |

APPENDIX 2

Form used by NMFS and IATTC field and laboratory technicians to collect life-history data on dolphins killed in the tuna purse-seine fishery.

PORPOISE LIFE HISTORY FORM

NOAA FORM 88-129
NMFS 11/80

NOAA
U.S. DEPT. OF COMM.

CARD 1

CR. # (1–4) SPECIMEN # (5–12)

SPECIES/STOCK (13–14) SEX (15)

DATE (YR/MO/DAY) (16–21) SET # (22–24)

POSITION (LAT/LONG) (25–33) QUAD (34)

TOTAL LENGTH (cm.) (35–38) COLORATION (39)

LACTATING ? (40) FETUS: SEX (41) LENGTH (cm.) (42–45)

COLLECTED ?: TEETH (46) TESTIS (47) OVARIES & UTERUS (48)

FETUS (49) STOMACH (50) HEAD (51) CARCASS (52)

PHOTOS ? (53) ROLL # _____ FRAME(S) # _____

COLOR PATTERN & DORSAL FIN:

BASIS FOR STOCK ID.:

_____
(OBSERVER'S NAME)

IN FIELD

NOTE: IF FETUS < 25 CM., LEAVE IN UTERUS & PRESERVE (do not sex & measure in field)

IN LAB

54 TOTAL WEIGHT (gm)	61 Lt. GONAD (gm) 67	68 Rt. GONAD (gm) 74	75 Ln (mm)	S.G.	E	80 BL
			RIGHT TESTIS			

CARD 2

1 REPEAT COLS. 1–11, CARD 1 11	12	13 LAYERS 15	16 C.L.	17 1 19 2 21 3 C.L. DIAMS. (mm)	23 CA (L)	25 CA (R)

27 FOLL. DIAM. (mm)	30 1 32 2 34 3 36 4 38 5 40 6 C.A. IN LEFT OVARY	42 1 44 2 46 3 48 4 50 5 52 6 C.A. IN RIGHT OVARY	54 Total CORP. (C.A.+C.L.)

56 TUBULE DIAM. (mm)	59 FETUS WEIGHT (gm)	66 READING STATUS	68 READER CODE

C. A. diams. (mm), by Type

1	2	3	4	5	6

NOTES (Uterus, Etc.):

DISPOSITION OF MATERIALS: